

Tactical Management In Focus: Adaptability and Information Systems

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Abstract. Tactical Management is an area where businesses can pursue competitive advantage. Lately, it has been under-addressed and even ingested by operational and strategic trends in Management and Information Systems. It needs adaptability as managerial way of thinking and acting along with proper information requirements recognition, in order for the person performing the tactical management function to accomplish best possible outcomes. With our research we are aiming to provide support in increasing the adaptability to changes for tactical management. At the same time, we are mapping the tactical management information system needs, to prove that they are distinctive from strategic, operational and project management information needs and should be addressed accordingly.

Keywords: tactical management, information systems, adaptability, sense and respond, requirements engineering

1 Introduction to the Context of the Problem Domain

The goal of the research is to delineate Tactical Management as a managerial function in order to provide comprehensive insight of its Adaptability and Information System needs. The foundation of the problem domain is in the setting that the person performing the function of tactical management is expected to manage a Complex Adaptive System, and steer it towards a purpose, continuously facing limitations and changes in the resources and environment. Furthermore, there needs to be compliance with the organizational context, as well as ongoing capture of the environmental everyday developments that influence the achievement of an outcome. The research is aiming to result with an artifact as a method for the person in the shoes of a tactical manager that embodies principles, guidelines and prescriptions on how to achieve adaptability for the tactical management function and proper information system self-design. We are addressing the following research questions: (1) what are the Tactical Management adaptability needs; (2) which are the Tactical Management Information Systems requirements and (3) how to design a method that addresses those needs.

Our initial constituent in the research problem are changes. Initially, we are making a distinction between adaptable and adaptive systems. A system or entity is **adaptable** if it can be adapted to changes by someone else. This means that someone (for exam-

ple, the manager) can be put in position to: design, steer and adapt the system towards a purpose. On the other hand, a system or entity is **adaptive** when it is able to modify itself in order to adapt to changes. This is a subtle but paramount difference. We perceive the company, the team, departments being managed as **Complex Adaptive Systems (CAS)**. CAS is defined as “A system of individual agents, who have the freedom to act in ways that are not always totally predictable, and whose actions are interconnected such that one agent's action changes the context for other agents” such as departments, organizations, ... [17]. The CAS is adaptive by itself. Also the entities it is consisted of are adaptive – in our case the people, or groups of people [1].

If we incline on some rules of balancing complexity on the ‘Edge of chaos’, we should not be addressing complex subjects with complex solutions. The ‘edge’ needs both structure and freedom. The addressing of a complex system needs: (1) Simple rules; (2) Moderately dense connections; (3) Human rules on: how to detect information, how to interpret information and how to act in response [20]. Hence, when facilitating and managing CAS towards a purpose, one should be introducing rules, connections, information detection and interpretation, and response guidelines; not complex or even complicated rigid solutions that, by definition, detain adaptability, rather than integrate it. Furthermore, when performing the tactical management function, the manager needs instructions on how to act, think and behave appropriately in order to facilitate a **socio-technical system** to continuously fulfill its purpose, for as long as required, in changing contexts, by **continuous context capture**.

We are proposing that for tactical management one needs to think in terms of ‘**system design**’, **not process flow**. The system a tactical manager sets up should be **adaptable** – one should be able to make modifications to it, so that consequently it adapts to changes. This would be the articulated purposeful adaptable mechanism that should give a framework for the manager to steer and for the CAS to follow. The Tactical Management Information System should capture and assist this behavior appropriately. The research problem is investigated more elaborately in section 3.1.

2 Current Status of the Tactical Management Adaptability and Information Systems

There is almost clear distinction between the ‘efficiency-centric’ and ‘adaptive’ managerial paradigms, in this post-industrial, knowledge-centric era. On one hand, the “make-and-sell” proponents are prescribing planning, efficiency and business processes; command-and-control management approach; matrix organizations. On the other hand, there is the “sense-and-respond” paradigm, where the unpredictability is expected and further integrated in the way of working and structuring of the organization. [7] Across this polarization is the project management model, where dynamic and to a certain extent flexible systems and relations are formed regardless of the organization’s current setting.

Our definition for tactical management as a managerial function is: *How to achieve what is expected by utilizing what is given and following certain governing principles in the current context of the organization and environment*. Through these identified constituents for tactical management, we searched for existing state-of-the-art concepts and support, in order to address a gap with unique viewpoint and provision.

Tactical Management Information Systems (TMIS) should be able to provide, record and revise in an adaptable manner, information for the continuous changes occurring in the behavior of the socio-technical system and its environment.

Issue 1: In our investigation, the Tactical Management Information Systems and Managerial Methods are somewhat **omitting** [16] and/or **under-addressing** the specificities of tactical management. Tactical management differs from operational, strategic and project management, in a number of characteristics, as it also has similarities with all of them. Hence, it should be recognized properly, in order to engineer the Information System requirements accordingly. Otherwise, the current situation will persist – information system designs, models and artifacts blend-in tactical management either to strategic or operational management – with regular reports, prevailing quantitative data, not very flexible custom combinations or ‘runtime’ changes to requests [16]. The approaches addressing information systems in general, and aligning them with the business needs, or providing assistance for the managers in organizations are diverse starting from Enterprise Ontologies, Enterprise Architectures, Business Modeling, Business Process Modeling – extended in the works such as Component Business Model, Business Motivation Model, Service Oriented Architecture, Business Intelligence Model (BIM) and i* [2][14], Business Event Processing, all the way to Business Activity Monitoring, Process Mining, Information Quality Improvement [16]. We try to enforce capture of the **multi-faceted aspects of context** (the device, the user, the task, the document source, the document representation, spatio-temporal dimensions: time, frequency and geographic location) to prove the exact information system needs.

Issue 2: With regards to the **necessity for adaptability**, of **the person** dealing with tactical management, and **of the system** that person is managing, we are emphasizing several components that introduce constantly changing environment and degree of unpredictability. We identify two kinds of ‘context’ that tactical management needs to take in consideration – **organizational context** and **environmental context**, where changes occur, especially for tactical management. The different approaches in literature perceive enterprise-wide or business process adaptability [2] [3] [10] [11] [12] and fewer offer artifacts for managerial adaptability as persons [4] [6] [12]

Issue 3: **The Person** dealing with TM is not supported with appropriate artifacts (investigation elaborated in section 3.1). Current artifacts offer organizational view, or if aimed for the manager (senior, project, operational) they don’t involve tactical issues to substantial extent (Strategic management – Balanced ScoreCard, Triple Bottom Line, The Performance Prism; Project management – PMBOK, Product Lifecycle; Operational management – Agile, Scrum, Lean)

3 Design Science Research

Design Science Research is gaining importance in current Information Systems research [5]. It enables the researchers, by going through the Relevance Cycle (Requirements, Field testing), the Design Cycle and the Rigor Cycle (Grounding, Additions to Knowledge Base) [8] to carry on scientifically acceptable and real-life implementable designs that reduce the time to improve the world with our contributions, especially since the artifacts are designed with assistance of current real-life entities.

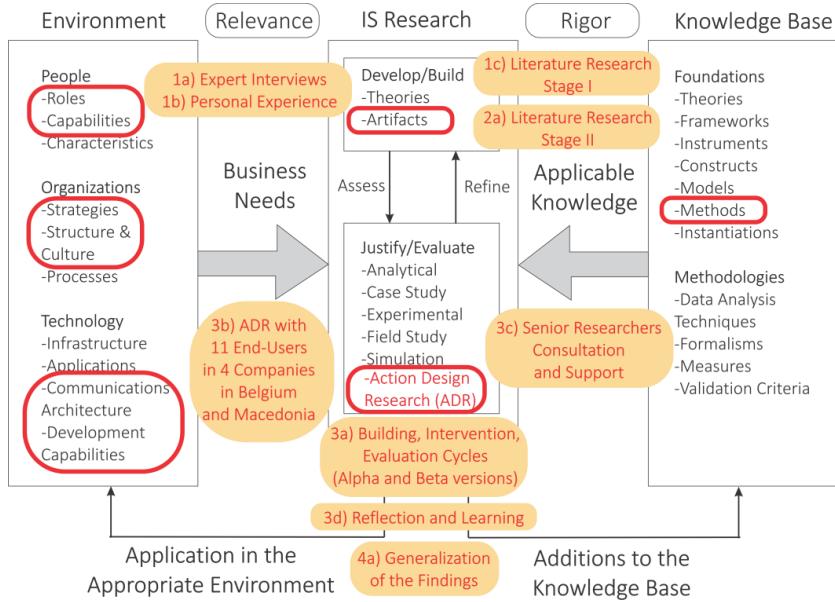


Fig. 1. Tactical Management Research as Design Science Research, adapted from [9]

3.1 Phase 1 – Identifying Tactical Management Adaptability Needs and Information System Requirements

During the course of the research, the main focus of the initial stage of the investigation was recognizing a problem. We started the research by conducting semi-structured interviews with 30 managers on various levels (Senior, Middle, Project managers, SME Owners) from, mostly international companies, but also SMEs situated in Belgium and in Macedonia, with geographic scope of work nationally and internationally. This activity supported the more accurate positioning of the problem; and provided us with expert opinions on various practices (Fig.1, labels 1a, 1b). Also, we investigated current State-of-the-Art contributions in literature, for tactical management adaptability and information systems (Fig.1, label 1c).

By interviewing managers in companies, we identified existence of lack of appropriate support with reports, information flows and ability to obtain them per request; treatment of the tactical management needs with approach identical as either operational management (with big data and no latency) or strategic management (with KPIs and quarterly reports, somewhat too late or inadequate) etc. The most frequent answer from the managers, on how they are addressing the issue of handling the mismatch between what is needed and what is provided, was by extracting the relevant data from reports in ERP systems and manually shaping it in Excel or by hand. This way they had been able to reach the needed information scope, structure, depth, manner of obtaining, and updating cycles. Furthermore, tactical management denotes ongoing and ‘runtime’ [19] [22] adjustments and changes in the people, systems, resources, expectations, processes that influence the outcome of any managed activity. Literature

review for supportive contributions to the problem of tactical management adaptability and information systems has been performed as described in section 2 of the paper.

3.2 Phase 2 – Investigating Literature for Grounding Reasons

After being supported with practitioner real-life problems that confirmed our initial standpoint, expert opinions of different practices regarding tactical management, we consulted literature for proper academic ground for design (Label 2a on Fig.1)

Currently, the approaches investigated in literature, provide adaptability as adjustment, predefinition, corporate agility, or response modeling [10] [11] [21] in terms of business processes and enterprise-wide business process re-engineering and adaptation [12]; goal oriented requirements engineering and relating requirements to organizational and business context [13] as well as prescriptions of modularity and adaptability prescribed in the Structure of the company [3] [2]; model-driven capability for continued focus on responsiveness and adaptability [12], or modeling and reasoning of strategic business plans involving tactical level [4], while the system design and the Sense-Interpret-Decide-Act loop are incorporated in the work of [6]

We used the Sense-and-Respond framework as foundation for the research contribution in TM. It provides (1) System Design and (2) Sense-Interpret-Decide-Act Loop for continuous discovering of early signals, reasoning upon them, and introducing changes and reconfiguration to the system accordingly. The main elements of the framework are purpose, strategy, structure, governance, which we are attempting to shape for the use of tactical management. The system is designed of roles and accountabilities, towards a purpose. Strategy is the “modular system design of roles and accountabilities” and in S&R organizations “structure is strategy”. The governance “is the systematic propagation and assurance of global policy constraints to all roles in the organization”. [6]

The foundations of the design throughout the research have been encompassing existing theoretical frameworks and concepts in: Information Systems, Management (Strategic management, Leadership, Operational management), Knowledge Management, Complexity theory, Complex Adaptive Systems, Behavioral science, Systems theory, Network theory with Social Network Analysis, Social Systems Design, as well as Research Methodology, Design Science Research, Action Design Research and Behavioral Research.

3.3 Phase 3 – Action Design Research as Research Method

The Design cycle took place in constant communication with Practitioners and Academics (Fig. 1, Labels 3a, 3b, 3c, 3d). We collaborated with 4 Companies for the Action Design Research (ADR) [18]: Company 1, small software implementations and consultancy – the Owner/manager of the company has been our End-user 1; Company 2, big consultancy with Headquarters in Belgium – a senior manager and 9 Project Managers and Team Leads have been our End-users 1-9; Company 3, small geodesic and engineering bureau – the Owner/manager of the company is our End-

user 10; Company 4, big production company with Headquarters in Macedonia – the Director of development department is End-user 11.

In the 4 organizational contexts-companies, the artifact design has been going through Alpha-version – in Company 2 (Belgium) and Company 3(Macedonia) we have investigated a tactical management issue – and proposed a Sense-and-Respond solution for the management to follow; Company 2(Belgium) – Optimizing staff utilization across projects (Microsoft Dynamic Implementations and Consultancy) and Company 3 (Macedonia) Shifting the Customer Perception for the Company (from only geodesic services to engineering, geodesic and consultancy services). The Beta-version took place in Company 1(Belgium) and Company 4(Macedonia) where we have investigated a tactical management issue – proposed S&R solution for the management to follow – and one manager in the companies carried on the usage of the design throughout next months to register all the information needs (Information Sensors, Emitters, Risks), changes as well as all system re-design needs – in Company 1(Belgium) – Enable customer's management to spend least time possible on remote communication with geographically scattered staff members; in Company 4(Macedonia) – Provide earliest information for status and discrepancies to management in a new factory construction and equipment alignment project.

To properly position a tactical management issue in the companies, we performed in-depth analysis of the company, business, mission, vision, goals, strategy, current systems, tactical management approach, expectations and SWOT analysis by conducting interviews, panel discussions with the End-users and cross-discussions with the management. We tried to point out the usefulness of the ADR in their company both for the researchers and for the company utilized their expert opinion and constructive criticism which was valuable for the outcome. After start, we trained the End-users with the primitive concepts and roadmap of the S&R framework.

We will argue that our Action Design Research has enabled us, throughout the timeline of 14 months of work with the End-Users, to go through advancing the Alpha- and Beta- versions of the design. We approached each manager and company with the same initially designed version of the initial artifact (in Excel Workbook of 4 sheets) which they filled and individually revised by performing the SIDA loop, but we informed each newly involved manager with the benefits of the use from the previous ones. It is certain to say that the 'learning' on the side of the researchers, has been communicated with the End-Users back and forth.

Our Design and Results so far. The artifact-in-construction (a method for the manager- the person) we tested with practitioners in the ADR has been consisted of the following investigation of adaptability and information system self-design:

1. Designing a **System**, according the Sense-and-Respond Framework principles (Visualizing and Specifying Purpose, Governing Principles, Role and Accountability, Conditions of Satisfaction)
2. Designing **Information Sensors** – what the manager would need to have as information to have overview of his system (Visualization, Attributes and Indicators)
3. Designing the **Information Emitters** – what the tactical manager would like to have been told by the other roles in order to be aware on time for possible issues disturbing the agreed outcomes (Visualization, Attributes and Indicators)

4. Designing the **Risk Management** (Visualization, Attributes and Indicators)

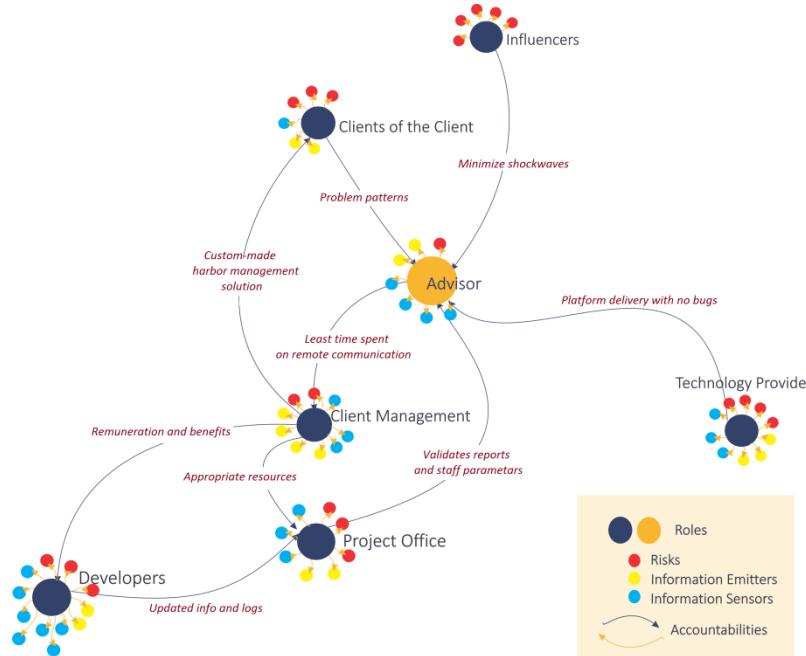


Fig. 2. Tactical Management Adaptability and Information System Needs Snapshot with Bipartite graph using Social Network Analysis, in a Role-and-Accountability Diagram, for the Role of ‘Advisor’

In the Sense-and-Respond framework, we identified 3 adaptability components:

- Adaptability component 1 - The Re-negotiations for outcomes, every role can perform through conditions of satisfaction, in order to adapt to changes.
- Adaptability component 2 – Introducing and terminating roles and accountabilities.
- Adaptability component 3 – Populating roles according human resources/systems. We consider the Sense-Interpret-Decide-Act loop as perpetual engine to adaptability, which enables the system designer (manager) to continuously scan the organizational and environmental context for changes, and receive early warning signals, on the entities previously incorporated in the widest system of Roles and Accountabilities. This opens the radars (Information Sensors, Emitters and Risks) and initiates information flows with variable content, frequency, type, manner of obtaining etc. The SIDA loop helps the managers reduce unexpected events and self-design the information system needs, on an ongoing basis, and identify whether some activity or information flow needed to be more efficient or automatized.

To present at least one of the resulting visualizations that present the system design and the tactical management information system, we are using the Social Network Analysis (SNA) tool – bipartite graph with nodes (for roles and information needs) and edges (for accountabilities). The two types of entities used in the graph are Roles

and Information Sensors, Emitters, Risks. Of course, such a static view (Fig. 2) for something so alive and changing, such as the Complex Adaptive Systems on one side, and our Sense-and-Respond system on the other, is not enough. But when presented on a timeline – using SNA timeline feature – the alive, adaptable, adaptive and flexible nature of tactical management and its information system needs comes before our eye-view.

3.4 Conclusion and Perceived Contributions

By conceptually positioning a manager to design and maintain a **Sense-and-Respond** system that is **adaptable** to the changes and unpredictability in order to manage a **Complex Adaptive System** towards a **purpose**, we are aiming to assist the manager in fulfilling this task successfully. Our focus on tactical management is purposeful because it has been under-addressed and to some extent inappropriately addressed [16]. Our selection of **Social Network Analysis** – graphs that visualize the network of roles (nodes), and the accountabilities (edges) has proven useful for the practitioners and theorists in the perception of the system, its reconfigurations, communications, information and risk sensors. When a timeline is used, the graphs become the most proximal representation of the system's adaptability and accurate designer of the tactical management needs for Information Systems. Our selection of **Action Design Research** and placing it in **Design Science Research Methodology** has been spontaneously driven by the motive to produce artifact that is immediately functional in at least one real environment; and to simultaneously involve design stakeholders from all aspects: practitioners, end-users, researchers, academics. We believe that tactical management information system needs have not been mapped to such depth and structure; the context capture (both organizational and environmental) and the proposed system design approach to becoming more adaptable while managing Complex Adaptive Systems represent distinctive traits of our research, as multi-, inter- and trans-disciplinary contemplation for both science and practice. The resulting artifact, as method, for the manager (the person) performing the tactical management function, delivers principles, guidelines and prescriptions that are expected to improve tactical management adaptability and map the tactical management information system distinctive requirements.

Acknowledgements. This research has been under valuable mentoring of Prof. Dr. Geert Poels, UGent, Gent, Belgium and Prof. Dr. Gjorgji Manceski, UKLO, Bitola, Macedonia as a Double PhD Degree pursuit.

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